LIBRARY
STATE PLANT BOARD

UNITED STATES

DEPARTMENT OF AGRICULTURE

BUREAU OF
ENTOMOLOGY AND PLANT QUARANTINE
NEWS LETTER

6

VOLUME VII

UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR APRIL 1940

Vol. VII, No. 6 (Not for publication) June 1, 1940

ADMINISTRATION

Bureau Appropriations

The bill to provide appropriations to the Department for the fiscal year 1941 is still being considered by Congress. Certain parts of the bill are still in disagreement, including two items which provide funds to the Bureau, namely, Pink Bollworm and Thurberia Weevil Control, and the new item, White-fringed Beetle Control. The House has accepted the Conference Report on other items that relate to the work of the Bureau. The changes made from the amounts provided for the current fiscal year follow.

Fruit Insect Investigations-- Increase of $11,916 over the Budget estimate for investigations on insects affecting pecans in Georgia and Texas-------------	$424,600
Mexican Fruitfly Control-- Increase of $7,500 but $7,500 below the Budget estimate-------------------------------------	167,960
Dutch Elm Disease Eradication-- $100,000 below the Budget estimate and amount for current year----------------------------	400,000
Forest Insects-- $40,200 below the Budget estimate and $40,600 below the amount for the current year-------------	212,500
Truck Crop and Garden Insects-- The Budget estimate, which is $15,000 less than that available for current year--------------	366,580
Cereal and Forage Insects-- Increase of $12,500 over the Budget estimate for investigations on Mormon crickets and grasshoppers. The Budget estimate provided a reduction of $16,700, involving reduction in certain work other than Mormon crickets and grasshoppers--	379,500

Barberry Eradication-- $12,500 below the Budget estimate and $12,500 less than available for current year--------------	$162,500
Control Investigations-- Increase of $5,000 over the Budget estimate and amount for current year. This is for investigations on methyl bromide----------------------------	72,518
Insecticide and Fungicide Investigations-- $9,984 below the Budget estimate and amount available for current year------------------------	125,000

FRUIT INSECT INVESTIGATIONS

Petal-fall spray valuable in control of plum curculio on peach.--The value of the petal-fall application of lead arsenate spray for reducing the overwintered population of plum curculio adults in peach orchards is shown by jarring records reported by Oliver I. Snapp, of the peach-insect laboratory at Fort Valley, Ga. The following table gives the number of plum curculios caught on April 5 to 10, between petal-fall and shuck-off, each treatment being replicated 5 times in a Latin square arrangement of plats with areas 6 by 6 trees each.

Treatment	Total trees	Total plum curculios removed
	Number	Number
Lead-arsenate spray applied April 2-------------------	175	211
Lead arsenate omitted--------	174	494
Do---------------------	178	509

These results show that there were more than twice as many plum curculios on the trees that did not receive the petal-fall application of lead arsenate as on those that did receive this spray, and therefore substantiate the data in support of the petal-fall application in the spray schedule for the control of the plum curculio attacking peaches.

New parasite of raisin moth larvae.--Forty-six hibernating larvae of the raisin moth (*Ephestia figulilella* Greg.), taken on January 20 from grapevine bark near Orange Cove, Fresno County, Calif., by Dwight F. Barnes and George H. Kaloostian, of the Fresno laboratory, were incubated at about 80° F. When the records of emergence were concluded on February 29, 11 *E. figulilella* and 14 ichneumonid parasites had emerged. Of the latter, 11 were *Idechthis canescens* (Grav.), the commonest parasite of overwintering larvae of the raisin moth, and 3 were a new species of *Exochus*, determined by R. A. Cushman.

MEXICAN FRUITFLY CONTROL

Trapping continues as citrus harvest ends.--The 1939-40 harvesting season for citrus fruit in the area regulated under Quarantine 64 closed at midnight April 30. Very little commercial fruit remained in the area at that time to be harvested, and no inconvenience or loss was occasioned growers and packers because of the harvesting season ending on that date. Infestations of the Mexican fruitfly were general throughout the area late in April. Permits to harvest fruit for shipment were issued only after thorough inspections. Relatively few groves were found free of infestations and, as a result, facilities for sterilization at high temperatures were in general use. Traps continued to take adults wherever they were operated. Of the 793 females taken, 679 were gravid. At the close of the month some young flies were being trapped in the groves and some emergence was being noted in cages set over infested fruit.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Winter survival of sugarcane borer in sugarcane.--The coldest weather since 1899 occurred throughout the sugarcane-growing section during January. E. K. Bynum and W. E. Haley, of the Houma, La., laboratory, made examinations of sugarcane trash and stubs the last of February and during March to determine the number of borers surviving the winter. Results of trash examinations are given in the following table.

Year	Light soil				Heavy soil			
	10-ft. samples	Tops and pieces of cane examined	Live stages found	Estimated live stages per acre	10-ft. samples	Tops and pieces of cane examined	Live stages found	Estimated live stages per acre
	Number	Number	Number	Number	Number	Number	Number	Number
Cane trash burned:								
1940--	898	13,765	10	8	559	9,209	5	6.5
1939--	452	14,510	58	93	222	3,677	4	13.2
1936-38---	510	--	155	197	--	--	--	--
Cane trash not burned:								
1940--	240	9,493	48	144	--	--	--	--
1936-38---	443	--	544	870	--	--	--	--

From the examination of 3,710 stubs, it was estimated that 6.4 live borer stages per acre had overwintered in cane stubble, as compared with an average of 28.6 per acre for 1935-39. Sugarcane trash left on the field during harvest is the principal source of the spring borer infestation. Most of the trash is burned. From figures obtained during trash examinations, it was estimated that an average of 1,571 pounds of millable cane was left on the field at harvesttime. This indicates that growers would be justified in more carefully gathering this millable cane during harvesting operations, especially as this cane is the principal material in which borers hibernate.

Winter survival of sugarcane borer in rice.--W. A. Douglas, of the Crowley, La., laboratory, examined rice stubs from 15 fields to determine the mortality of borer larvae following the unusually cold weather of January. The results of these examinations are as follows.

Vicinity	Condition of field during winter	Stubs examined	Larvae found Live	Larvae found Dead
		Number	Number	Number
Crowley--------	Drained	500	7	18
Crowley--------	Flooded	500	0	6
Bayou Teche---	Drained	500	4	5

Very few rice fields are winter flooded. The mortality in the nonflooded fields was 68 percent. Sleet and snow, which covered the ground to a depth of about 1-1/4 inches at Crowley, may have afforded some protection to the borers in the lower part of the rice stubs and thereby decreased mortality. From the preceding figures, it was estimated that the number of borers surviving last winter in rice stubs in nonflooded fields was 42 percent of the number surviving an average winter.

Survey of borer infestation in sugarcane.--During the cane-harvesting season of 1939, J. W. Ingram, W. E. Haley, and L. J. Charpentier, of the Houma laboratory, made a survey of borer infestation in the sugar section of Louisiana. This survey consisted of determining the percentage of joints showing external evidence of boring, per 100 stalks of millable cane, in each of 4 representative fields on each of 10 plantations. Varieties examined were in proportion to the acreage occupied by them in the district represented by the plantation. Each plantation examined was representative of an area producing one-tenth of the total crop. An average of data obtained showed that 19.74 percent of the joints were bored, which is the highest infestation observed in several years. Average infestation percentages for Louisiana in past years were: 1938, 15.85; 1937, 16.05; 1936, 8.70; and 1935, 8.10.

Relation of early borer infestation to late infestation.--In a comparison of early and late-season borer infestations, Ralph Mathes and T. E. Holloway, of the Houma laboratory, made examinations for borer-killed dead hearts (tops of young plants) in stubble cane in each of three variety test fields of the Bureau of Plant Industry in May and again in June 1939. Examinations for percentages of joints bored were repeated in these same test fields when they were harvested. In each examination for dead hearts, 180 row feet were examined in each of 6 replications of each variety at each test field, or a total of 3,240 row feet were examined for dead hearts. The percentages of joints bored at harvest are based on examinations of 15 stalks in each of 6 replications of each variety, or a total of 90 stalks of each variety in each test field. Total numbers of dead hearts caused by borers and average percentages of joints bored at harvest on the 3 plantations are as follows.

Variety	Total dead hearts	Average joints bored
	Number	Percent
C.P. 29/116------------	835	37.5
C.P. 29/320------------	485	28.9
C.P. 28/19-------------	287	22.5
Co. 281----------------	279	29.9
Co. 290----------------	205	26.3
C.P. 28/11-------------	163	25.4
Average------------	376	28.4

It may be seen that harvesttime injury was in general proportion to spring injury for all varieties, except that C.P. 28/19 and Co. 281 are considerably out of line.

Adult Phyllophaga of brood C ready to emerge.--T. R. Chamberlin, Madison, Wis., reports that diggings in southern Wisconsin showed that most of the adult June beetles of the "C brood" were in or near the sod at the middle of April and many were uncovered by plowing in the Lamont district. None was observed in flight or taken in bait traps during the month, but there had been much cold weather with snow. In mid-April most of the grubs were still deep in the soil, but a few were found in the sod in the higher portions of a pasture with southern exposure. On north slopes ice crystals were still present around the roots of some plants at the 20-inch depth.

JAPANESE BEETLE CONTROL

Spring nursery shipping season.--In the Westerly, R. I., area, a comparison of quantities of plant material inspected and the number of certificates issued shows a large increase in this April over April 1939. Nursery shipments also increased considerably in the New Haven, Conn., district. Improved weather conditions in the New York City area during the latter part of April resulted in an increase in the number of inspections and certifications. During the month some 18 carloads of large nursery stock were shipped under certification from the Long Island area. The increased volume of inspection work on Long Island resulted in the reassignment of 1 New York City office inspector to assist the 2 inspectors who are regularly assigned to Long Island. In New Jersey methyl bromide fumigation of nursery stock has been outstanding during the month, 11 fumigation chambers being in use. These were responsible for an increase of approximately 100 percent in the number of plants treated, as compared with those treated by various chemical means in April 1939. Records show that 86,620 plants were fumigated in New Jersey this month as against 43,827 a year ago. This month 11,887 azaleas and rhododendrons were treated with paradichlorobenzene, as compared with 1,712 plants similarly treated in April of last year. A New Jersey nurseryman used his fumigation chamber to fumigate winter clothing that he was packing away for summer storage.

About 87 carloads of nursery stock were shipped by New Jersey nurserymen during April. New Jersey nursery establishments in many instances are reported as having exhausted their supply of medium-to-large-sized stock. In some cases stock has been brought in from the mid-Western and New England States to fill orders. Extensive plantings of young stock have been observed throughout the State. The shipping season for deciduous stock was about finished at the end of April. There are now 34 methyl bromide fumigation chambers in use through the Japanese beetle regulated area. These have a total capacity of 11,736 cubic feet. The largest is 2,000 cubic feet and the smallest 50 cubic feet. A total of 177,646 plants was fumigated during April. Four additional nurseries are contemplating building chambers in the near future. A report from the Pittsburgh district office states that not until the middle and latter parts of April did evergreen and other balled stock begin to pour into that area by carload and motortruck. Then business increased to the extent that extra seasonal help was added to take care of increased sales. It is anticipated that this year will see an increase over the estimated 200 carloads of material sold in the Pittsburgh area last year. During April 32 carloads of nursery stock were shipped from the Salisbury, Md., area. At one of the packing houses inspectors worked in shifts while millions of strawberry plants and numerous orders of cane stock were being shipped. On several occasions it was necessary for 1 or 2 inspectors to work until after midnight. A large nursery at Towson, Md., reports that to date more shipments have been made than in 1939.

Water seal simplifies construction of fumigation chamber.--A number of difficulties were encountered in the construction of an airtight fumigation chamber at one of the large northern New Jersey nurseries. The most difficult feature was to construct and make tight an exhaust trap door for the ventilating system. Upon the suggestion of one of the members of the treating section, the nursery constructed a water-seal door that has proved satisfactory. Tests made in small chambers that can be made very airtight have shown that the heat and gas expansion in the box during the fumigation process exert only a 1 mm. mercury pressure. This is about equal in weight to a ½-inch column of water, so that an all-around seal of 1½ to 2 inches of water is sufficient to hold the gas in all commercial chambers. The use of the water seal simplified the construction and made the seal positive, eliminating the use of halide detectors for checking the opening. The only checking necessary is to see that the water channel is filled before fumigation begins. This same type of seal can also be adapted for fresh air intakes.

Revision of Japanese beetle quarantine regulations.--Effective April 5 the Japanese beetle regulated area was extended to include additional territory in Maryland, New York, Ohio, Pennsylvania, and West Virginia. The area of continuous infestation from which the movement of fruits and vegetables by refrigerator car and motortruck is restricted was also extended to include New York City and surrounding area, together with additional extensions in Maryland, New Jersey, and Pennsylvania. To take care of early emergence of adults on the Eastern Shore of Virginia, the season during which inspection and certification of produce is required from certain parts of this area was advanced to June 1 instead of June 15. In the Departmental news release announcing this revision of the regulations, announcement was made of a decision to continue the Japanese beetle quarantine. This matter had been discussed by nurserymen and plant-quarantine officials from 18 States and Canada at a public conference held in Washington on February 27.

"Balled and cottoned" nursery stock.--War conditions have prevented the importation of Dutch and other burlap used in large quantities by nurserymen. This shortage has given the southern cotton mills an opportunity to cover the shortages with present and new types of cotton fabrics. New Jersey nurseries have been using heavy cheesecloth and even onion sacks where wide-mesh burlaps have previously been used. To meet a scarcity of German peat, a South Jersey dahlia grower is substituting for a packing material a combination of corn and oats chaff and chopped oats straw. This makes a light, fluffy material.

Beetle-proof greenhouse invaded by frightened deer.--Early this spring a frightened deer jumped through the glass of a certified greenhouse owned by a Columbia County, Pa., grower. After running up and down the beds of sweet peas and potted plants, the deer jumped out through the glass on the opposite side of the house. To prevent a recurrence of this episode, this grower recently constructed a greenhouse 100 x 13 feet in which all of the glass used was taken from the windshields and doors of junked automobiles. All glass was procured from one junk yard.

Spruce tree inspected for President Roosevelt.--During the month an inspection request was received at the New York City office from the estate of Mrs. James Roosevelt, Hyde Park, N. Y. President Roosevelt wished to ship a spruce tree to California. Certification was granted after the original soil on the tree had been washed off and replaced with sterilized soil obtained from a classified nurseryman.

Soil sampling reduced.--Collection and analyses of soil samples from nursery plots, heeling-in areas and frames began in April and will be completed by the middle of May. There will be a reduction in the number of nursery units to be sampled, particularly in the heeling-in areas and frames.

Temporary inspectors added to New England force.--Thirty-three temporary inspectors were employed in connection with the inspection of nursery products in the New England States during April. The duration of employment varied with the location of the nursery and the date when digging operations began. Owing to snow, cold weather, and an unusual amount of frost in the ground, New England nurseries were unable to begin digging until April 1. This is the first season on record that digging has been so long delayed over the entire New England area. In Rhode Island and Connecticut digging operations began on April 5; in New Hampshire on April 8; in Massachusetts on April 10; in Vermont on April 17; and in Maine on April 27. Two temporary inspectors were employed in Rhode Island, 18 in Connecticut, 4 in Massachusetts, and 9 in Maine. The 9 inspectors in Maine were located at a forest nursery where there are over 2,000,000 trees to be inspected for shipment to points outside the gypsy moth regulated area. At a nursery in Cromwell, Conn., 4,298 balled and burlapped evergreens were fumigated with methyl bromide for shipment to points outside the Japanese beetle regulated area. Prior to their fumigation each evergreen had been examined for gypsy moth infestation. At a nursery in Manchester, Conn., 46,448 miscellaneous plants were fumigated. It was also necessary to inspect many individual shrubs and evergreens destined to points outside the gypsy moth regulated zone.

Gypsy moth infested shipments.--Of 72 gypsy moth egg clusters removed by inspectors during the month of April, 9 were taken from 9 shipments of nursery stock destined to Connecticut, Indiana, New York, Pennsylvania, and Vermont. The remaining 63 egg clusters were removed from 8 carloads and 4 truckloads of lumber.

Analysis of relative scouting performance in 1939.--As a basis for individual reemployment and for selecting new Dutch elm disease scouts to be paid from Departmental funds in 1940, the performances of scouts employed in 1939 have been tabulated. Over 6,000 men filed applications and approximately 5,000 were offered jobs. Only 2,251 accepted. Only 1,647 successfully completed scout training and only 1,394 made satisfactory scouts during the summer. From 75 to 100 percent of the men from the States of Illinois, Kentucky, Maryland, Massachusetts, Michigan, Rhode Island, Tennessee, and West Virginia made satisfactory scouts. Only about 50 percent of the men from the New York City metropolitan area graded as satisfactory. The average for all States was 62 percent satisfactory scouts. Men were obtained from 196 colleges. Of these colleges, 12 furnished 10 or more men, at least 75 percent of whom made satisfactory records. Of the 11 colleges in the major work area, none was among these 12. From general observation it appeared that farm-reared men were slightly more adaptable to Dutch elm disease scouting than were city-reared men. Of the men who made satisfactory scouts, college men made an average rating of 86.9 at the end of 2 months' work as scouts. Those who had an average of 2 years' and 3 months' experience, mostly as W. P. A. workers on the project, made an average rating of 87.6. Two conditions definitely contributed to an excessively large number of failures to report and a large number of failures in scout training. First, some college officials and employment agencies supplied the names of men who could not meet the physical and financial requirements and who apparently never seriously considered taking the job. Second, because of the short time available, the list of selected men was soon exhausted and any qualified man who applied was accepted. Many of these had no real interest in the work and, because they were near home, quit the job as soon as the training became too tough. Including the satisfactory scouts employed on W. P. A. in 1939 and no longer employable on W. P. A. funds, there should be available about 1,500 well qualified men who can be employed on regular funds this summer. Probably an additional 500 men who made fair scouts in 1939 can be reemployed. This will eliminate the need for extensive scout training this summer and should make available a highly satisfactory force at the beginning of the season.

Floods interfere with Dutch elm disease eradication.--In Pennsylvania a continuous rain on the week end of March 30 caused a rapid rise of the Delaware and Lehigh Rivers to the flood stage. Four of five elm bark beetle traps placed in the areas along the Delaware River in Monroe and Pike Counties were washed away. Later in the month flood conditions along the Ohio River closed all roads leaving Athens, Ohio, where elm-sanitation work is in progress. The city was completely isolated from April 19 to 23. Flood conditions were claimed to be the worst in that vicinity since 1913. A large percentage of the employees were unable to reach Athens to report for work during the latter part of that week. The scouting location could not be reached and burning was resorted to temporarily by the workers.

Bark-beetle brood galleries in green elm.--Examination of a confirmed tree in North Branford Town, New Haven County, Conn., disclosed an interesting condition, in that the tree was heavily infested with larvae of Scolytus multistriatus Marsh. in the crown and upper trunk. Adult Scolytus had entered the green lower trunk in large numbers during the last season. The larvae had hatched and started their galleries but apparently had died after completing about ½ inch of the gallery. This apparently is the first case found in the Connecticut area where any of the brood galleries appear in green wood, as in all other cases observed the adult had penetrated to the live sapwood and then backed out.

Fire regulations hamper burning of elm wood.--In Connecticut several district fire wardens refused to grant permission for any burning of wood or brush during the months of April and May. This condition was brought to the attention of the assistant State fire warden, who worked out satisfactory arrangements whereby permission will be granted for the burning of wood, except on extremely hazardous days, as reported by the Weather Bureau and announcements over the radio.

First-record infection in Philadelphia County, Pa.--A first-record infection was reported from Philadelphia County, Pa., during the week of April 20. This tree, with a d.b.h. of 42 inches, was located on State property approximately 550 feet west of U. S. Route 1, just south of Poquessing Creek, which forms the northern boundary of Ward 35, Philadelphia County, and the southern boundary of Bensalem Township, Bucks County.

First-aid courses for eradication supervisors and foremen.--First-aid courses were in progress during April in Westchester, Putnam, Ulster, and Orange Counties, N. Y. Reports from the various counties indicate that attendance was good and keen interest was manifest in the courses. Similar courses were also offered in Connecticut, New Jersey, and Pennsylvania.

FOREST INSECT INVESTIGATIONS

List of insects associated with elm being compiled.--Before being transferred to the Asheville, N. C., laboratory from the Morristown, N. J., laboratory on April 16, C. H. Hoffman submitted a manuscript entitled, "An Annotated List of Elm Insects." It is based on records found in the different files of the Bureau of Entomology and Plant Quarantine and those gleaned from available entomological literature. Only those species thought to be intimately associated with elm through breeding, feeding, ovipositing, or hibernating have been included. The list includes 591 species belonging to 438 genera, 123 families, and 11 orders. The order Coleoptera leads in the number of species represented. In this order there are 46 species of Cerambycidae, 35 Scarabaeidae, 28 Scolytidae, and 24 Curculionidae. Among the Lepidoptera there are 20 species of Geometridae and 17 species of Noctuidae. The Hymenoptera are mostly parasites of bark beetles and borers. There are 25 species of Braconidae and 22 species of Ichneumonidae. Fifty species of Coccidae and 17 species of Aphiidae are included in the order Homoptera.

Forest tent caterpillar outbreak practically at an end.--J. V. Schaffner, Jr., New Haven, Conn., reports that a series of sample plots in Vermont and western Massachusetts, where observations have been made throughout the outbreak, were visited this spring to obtain data on the 1939 egg deposit. Because of the difficulty in making accurate counts of egg clusters in a limited time at each point, the number of egg clusters collected and actual time spent were recorded. This, of course, does not give definite data on the existing population but, taken over a period of years, it shows the trend of infestation. Below are listed the collection points and the rate per hour that egg clusters were collected for the years 1936 to 1939, inclusive. (The years in which eggs were deposited are listed, although the collections were made the following spring.)

Town	Type of plot	Egg clusters collected per hour in--			
		1936	1937	1938	1939
Massachusetts:					
Williamstown	Shade trees	--	154	72	20
Vermont:					
Barre	Shade trees	2/--	--	98	1/ 6
Bennington	Sugar orchard	61	97	16	0
Bridport	Shade trees	86	49	(3)	--
Bristol	do.	37	29	16	0
Danby	Sugar orchard	82	38	12	0
Dorset	do.	--	46	14	0
Dorset	Mixed hardwoods	2/--	58	38	5
Pawlet	Sugar orchard	2/49	29	38	11
Randolph	do.	2/52	72	26	5
Richmond	Shade trees	2/ 5	8	0	0
Springfield	Mixed hardwoods	2/54	40	28	15
West Rutland	Sugar orchard	2/55	79	26	4

1/ Some of the trees sprayed in 1939.

2/ Some trees severely defoliated prior to 1936.

3/ Trees were sprayed in 1938.

An examination of the above table shows that there was a general decline in the infestation for most of the sample plots in 1938 and a very definite decrease in 1939.

Pine plantations sprayed for control of white pine weevil.--S. F. Potts, New Haven, Conn., reports that over 30 acres of white pine in New York, ranging from 6 to 14 feet in height, were treated with concentrated sprays for the control of the white pine weevil during the latter part of April. This work was conducted in cooperation with the New York Conservation Department. The concentrated spray consisted, by weight, of 1 part lead arsenate, 10 parts water, 0.3 part linseed oil, and 0.03 part aresket. It was applied at the rate of 4 to 6 gallons per acre, using ordinary knapsack sprayers, each equipped with a special type of extension rod and solid-cone-type nozzle for atomizing concentrated spray. The treatment cost about $2 per acre for materials, labor, and equipment. Previous experiments have shown that excellent control of the weevil may be obtained by this method. As thousands of acres of young white pine and Norway spruce are threatened with virtual ruin by this weevil, it is felt that this method of control should have a rather wide application.

Parasite of European spruce sawfly reared in laboratory.--Frank E. Miller, Jr., a collaborator at New Haven, Conn., reports that a series of 76 pairs of Microcryptus basizonius Grav., an imported parasite of Diprion simile Htg., were studied in the laboratory as parasites of the European spruce sawfly (Gilpinia polytoma (Htg.)). Data obtained on the length of life of each female and the number of eggs deposited, as well as the sex ratio of the progeny, indicate that the rearing of the species in the laboratory is practical. The 76 females lived a total of 1,819 days, an average of 24 days per female, and deposited an average of 22 eggs per female, or a total of 1,689 eggs during the period. The 1,689 eggs were all laid during 1,047 of the 1,819 days, however, giving an average daily egg production per female of 1.62 eggs per oviposition day. The total number of eggs laid per female ranged from 1 to 56, with an average of 22. The preoviposition period ranged from 1 to 12 days. The average female began laying eggs on the fifth day. The postoviposition period was much longer, several females living more than 20 days after completion of egg laying. The average period of oviposition was 14 days, but the period ranged from 1 to 30 days. In general, oviposition was continuous, 43 of the females laying their complete series of eggs uninterruptedly and 33 of the females laying their eggs with interruptions of 2 to 8 days at a time. The oviposition period was considered as the elapsed time between the deposition of the first egg and the last. In the 3 generations of Microcryptus reared in the laboratory this year the sex ratio has ranged from the normal 1:1 to an excess of males averaging less than 5 percent. Samples of the progeny of the 76 females studied in the above experimental work have yielded 130 females and 134 males.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Conditions affecting gypsy moth work in New England.--The thawing of the roadbeds developed frost heaves on hard-surfaced roads and serious mud conditions on dirt roads, which necessitated extra precautions in automobile driving. Many crews were obliged to walk long distances from the nearest point that could be reached by automobile to the scenes of their work. In general, satisfactory progress was made in all departments of gypsy moth work during April.

Scouting and clean-up work nearing completion in several Vermont areas.--An additional infestation consisting of one gypsy moth egg cluster was located in Bristol Township, Addison County, Vt. No further egg clusters were found, although intensive scouting of trees and careful examination of ground debris was performed in an area of considerable radius around the point where the egg cluster was discovered. Bristol is located approximately in the center of the Vermont section of the barrier zone. During the first part of April conditions were such at this and other infested sites in Vermont that ground work could be conducted without interference from snow. Every effort was exerted to complete the work at these infestations so that the trash wood and brush could be burned before the ground litter became so dry that the building of fires would be dangerous, and also to complete the scouting of areas around sites where assembling cages had attracted moths last summer. Several of the gypsy moth infestations found in Vermont during the past winter were located in small hardwood growth where thinning work has since been completed and in which the problem of eradicating the insect has been simplified. Scouting work in the township of Jericho, Chittenden County, was completed in April with no discovery of any indication of the presence of the gypsy moth, and the crew began scouting along the banks of the Winooski River, which flows through Richmond Township.

Conditions favor extermination of newly found infestation.--A gypsy moth infestation consisting of about 50 egg clusters was found in April in a high and exposed location on Clarksburg Mountain, Clarksburg Township, Berkshire County, Mass. The center of the infestation is located in scrubby hardwood growth which is so exposed that wind spread into a rugged and extensive tract of forest nearby might be reasonably expected, with the proper combination of conditions immediately following the hatching of the small caterpillars. However, the infestation is accessible, and this and other propitious circumstances appear to favor the extermination of the colony by spraying with lead arsenate at the proper time.

Autogiro nearly ready for aerial attack on gypsy moth.--The reconditioning and assembly of the autogiro owned by this activity, which has been completely overhauled during the past winter at the repair shop in Greenfield, Mass., is progressing satisfactorily. This machine is used for aerial observation in the gypsy moth infested area, and for the distribution of arsenical insecticide from the air.

Gypsy moth infestation in residential area apparently eradicated.--Upon receipt of a report that 2 gypsy moth egg clusters had been found in a residential section of New Haven, Conn., a small crew of agents was detailed to scout the neighborhood. These men found and destroyed 23 new egg clusters, several of which had been deposited on privet hedges and other ornamental shrubs and the remainder were located on nearby shade trees. Although a wide area around the center of infestation was closely examined, no further evidence of the insect was found. As a precautionary measure the infested area will be sprayed early in June.

Tree climbers busy at heavy infestation.--At the severe gypsy moth infestation in Southbury, Conn., a crew of men continued to climb trees in order to remove broken branches and trim off splintered stubs resulting from a severe ice storm which did much damage along the Connecticut coastal area early in March. As the shattered branches provide ideal situations for the deposition of gypsy moth egg clusters which are difficult to locate, their removal will simplify the scouting of this area after the next adult season. Scouting work was recently begun in the adjoining town of Roxbury to determine the extent of the spread of the infestation in that town from the Southbury infestation. Several egg clusters have already been found and creosoted in Roxbury.

examination before becoming eligible for fire fighting, and all of the enrollees in one camp who failed to pass the physical examination, or who were below the age limit for fire fighting, were placed in one large crew and assigned to gypsy moth work. Although 1 camp in Massachusetts was removed from gypsy moth work, this loss was offset by the return to gypsy moth work of another camp that has been engaged in forest-fire-hazard-reduction work much of the time since the hurricane. The work of the C. C. C. gypsy moth crews consisted of scouting, creosoting egg clusters, burning brush and debris, and selective-thinning work. Emphasis was placed on rapid scouting to locate concentrations of infestations for ground spraying work in Massachusetts and Connecticut, and numerous suitable areas were found where scattered infestations of large egg clusters were present. In contrast to the scattered infestations in these 2 States, large areas were found in the town of Rockingham, Windham County, Vt., and vicinity where the infestation is very heavy and concentrated, and where approximately 272,000 gypsy moth egg clusters have been destroyed so far this season.

Preparations made for C. C. C. gypsy moth spraying.--Arrangements have been made for this Bureau to loan nine spraying machines for C. C. C. spraying work in Massachusetts and Connecticut this year. The machines will be operated 12 hours per day on a double-shift basis in Connecticut, but the machines in Massachusetts will operate on a single-shift basis because of the lack of sufficient man-power and supervision for a double shift. Arrangements were also made with the gypsy moth division of the State Entomologist's office in Connecticut to use a considerable portion of the State organization to assist in the C. C. C. spraying work east of the barrier zone in that State, and for the use of State-owned spraying equipment. The C. C. C. has purchased approximately 31 tons of lead arsenate and 1,787 gallons of fish oil for the work in Connecticut, and 8 tons of lead arsenate and about 500 gallons of fish oil for use in Massachusetts.

Private gypsy moth control work encouraged by the C. C. C.--Contacts with C. C. C. foremen in charge of gypsy moth work have been influential in making clear to several woodland owners the advantages of private gypsy moth control work on their properties. The foremen have encouraged the owners to do various types of work and occasionally have advised them as to the proper procedures. As a result, one property owner has employed several men throughout the winter in creosoting gypsy moth egg clusters; another has performed selective thinning work all winter to reduce the susceptibility of his woodland stand to gypsy moth increase; and still another owner has agreed to plant pine trees, which are not favored food plants of the gypsy moth, in an area where a C. C. C. gypsy moth crew had made a clear cutting of growth particularly favorable to gypsy moth development. Another instance of cooperation occurred when the cordwood cut on city property by the C. C. C. in the course of thinning operations was taken by the city and delivered to needy citizens.

PLANT DISEASE CONTROL

Studies on preservation of flowers and fruits.--Clarence R. Quick, of the Berkeley, Calif., blister rust office, recently summarized data on a series of tests initiated in 1935 on the preservation of the form and color of flowers, fruits, and leaves. These studies were undertaken at the

Planned gypsy moth scouting in Pennsylvania nears completion.--The approved plan of gypsy moth scouting work for the current fiscal year is rapidly approaching completion in the Pennsylvania area, despite supplementary additional work made necessary because of infestations discovered in the vicinity of assembling cages that attracted male gypsy moths last summer. A small infestation that covered approximately 2 acres was located in Mauch Chunk Township about the middle of April in the vicinity of two assembling-cage sites where male moths were taken last season. Field conditions in the Pennsylvania area had improved to such an extent by the middle of April that all types of gypsy moth work could be conducted without interference from snow. The forests had become very dry, and it was necessary to discontinue burning brush, except for a few hours immediately following rain. Considerable supplemental ground work was done at infestations found when the ground was covered with snow, and additional egg clusters were located and destroyed.

Gypsy moth inspection work increases in Pennsylvania.--Mild weather in Pennsylvania enabled the nursery dealers and collectors to begin digging wild plants and shrubs by the middle of April. The movement of kalmia and rhododendron plants, which are abundant in the area infested by the gypsy moth, was particularly marked. This, together with a large increase in the amount of scrap metal received at junk yards within the quarantined area, added materially to the inspection work in that section.

Experienced men obtain spraying permits in Pennsylvania.--Picked men selected for their long experience in gypsy moth work were detailed early in April to the work of obtaining spraying permits from property owners in the settled communities in Pennsylvania where gypsy moth spraying will be necessary during the coming season. The property owners have observed the decided benefits derived from spraying and appreciate this phase of the work more than they did when gypsy moth eradication work was first started in Pennsylvania several years ago, and few objections to the spraying work are now encountered. Approximately 1,500 permits, most of them needed for the planned spraying work this year, had been obtained by the end of April.

Report of C. C. C. gypsy moth work for three-quarters of fiscal year.--The report of C. C. C. gypsy moth for the first 9 months of the fiscal year 1940, which ended on March 31, shows that 47,081 6-hour man-days were used in gypsy moth work east of the barrier zone under the supervision of this Bureau. This resulted in the examination of 79,883 acres, 3,817 of which received intensive creosoting work and 1,336 acres were selectively thinned. During the course of this work, 1,226,146 gypsy moth egg clusters were destroyed by burning and creosoting.

C. C. C. gypsy moth work increases during April.--Time spent on gypsy moth work done by C. C. C. enrollees under the supervision of this Bureau in the territory east of the barrier zone increased during April from 1,419 6-hour man-days during the first week to approximately 2,000 man-days during the week ended April 27, despite various interruptions. Considerable time was lost because of stormy weather, the training of gypsy moth crews in fire-fighting work, and the retaining of some of the men in the camps for dental work. Some plans of work were necessarily modified so that the crews could work within call if needed for fire fighting. All C. C. C. enrollees are required to undergo a thorough physical request of personnel responsible for the handling of educational material, who expressed a desire to improve preservative solutions for Ribes and pine specimens. In 1935, 17 solutions were prepared and tested as preservatives of the form and color of sundry flowers and fruits, and 7 of the more satisfactory of these solutions were retained from this first series, and the tubes containing preservative and plant specimens were stored for 5 years. In March 1936, 18 preservative solutions were prepared and tested on leaves and fruits of R. californicum and on the flowers of 10 species of Ribes. After 4 to 5 years of storage in the various preservatives, the colors of green leaves, and several typical colors of flowers and fruits were, as a group, best preserved in a solution that contained copper sulfate, sucrose, formaldehyde, ethyl alcohol, and boric acid. Copper sulfate appeared particularly valuable in preserving the green color of leaves. On the basis of these tests, 100 cc. of the best all-purpose single-solution preservative contained: 6 cc. formaldehyde (40%), 25 cc. boric acid (4%), 4 cc. copper sulfate pentahydrate (10%), 4 cc. ethyl alcohol (95%), and 61 cc. water, in addition to 10 grams of sugar.

Phenological notes from the Southern Appalachians.--In the Southern Appalachian States leafing out of the Ribes bushes was greatly delayed by the cold weather in April. Freezing weather occurred in all seven States in the region as late as April 12. Skunk currants in the mountains of Green County, Tenn., had very small leaves on April 24. In Raleigh County, W. Va., as late as April 28 some gooseberries were found in dormant condition, although small leaves were seen on a few bushes. The aecial pustules of the blister rust were in considerable evidence in Virginia and Maryland, the first to be reported as open being on April 4 in Augusta and Rockingham Counties, Va. As late as May 3 they were noticed in abundance in Garrett County, Md., at Deep Creek Lake Dam. A photographer from Georgia visited these areas early in May to take colored motion pictures of blister rust damage to pine and to show the different stages of fungus development on pine.

Ribes hybrid found growing in Wisconsin.--Ribes fasciculatum, a Ribes heretofore not reported in Wisconsin, was found growing in Grant Park in Milwaukee. The plant appears to be a hybrid, apparently the ornamental alpinum crossed with japonicum. The fasciculatum plants found were apparently the variety chinense Maxim. A specimen of this hybrid was taken to the Milwaukee blister rust office. The buds were just beginning to break on the plant. A characteristic of this hybrid is the fact that it carries its fruit on the main stems and the fruits are held over winter. The fruits remain reddish color throughout the winter, making the plant desirable for ornamental use and it would also seem desirable as winter food for wildlife. This Ribes was found to be susceptible to blister rust by Spaulding in his inoculation tests of Ribes species (U.S.Dept. Agr. Bull. 957, p. 19).

Inspection in West Virginia shows excellent Ribes-eradication work.--R. G. Pierce reports that a recent inspection of a blister rust control area near Watoga State Park in Pocahontas County, W. Va., initially cleared of Ribes in the winter of 1933 by C. C. C. workers and "mopped up" in 1934 by P. W. A. employees and possibly once since but not later than the spring of 1937, revealed not a single Ribes bush. A similar inspection of an area at Skelton, W. Va., worked first by P. W. A. employees in 1934 and reworked by

LIBRARY
STATE PLANT BOARD

C. C. C. men in 1939, revealed but six Ribes bushes in 4½ hours' search on April 28. The 1934 Ribes were still visible where they were hung in crotches of trees and could be distinguished easily from the 1939 eradicated bushes. In the latter year only a few bushes were found per acre, as compared to the larger number found in 1934. These two areas show excellent Ribes-eradication work.

Blister rust cankers on sugar pine.--The Office of Forest Pathology in San Francisco reported the finding of two incipient blister rust cankers on sugar pine at Montgomery Creek, in northern California, the site of the abundant Ribes infections discovered in 1938. W. V. Benedict and C. P. Wessela, of the Sugar Pine Region, during the last week in April, found a single incipient canker, also on sugar pine, on the easternmost control unit in the Klamath National Forest. The discovery was made in the drainage of Beaver Creek a few miles south of the Oregon line.

Rust infection on barberries reported from five States.--Barberry bushes became infected with stem rust in Virginia, West Virginia, and Illinois about April 25, and some infection was reported from Colorado and Iowa between that date and May 10. Generally speaking, infection this year is a little later than usual, apparently owing to cold and otherwise unfavorable weather, except in Illinois, where infection was observed on barberries on April 25, whereas May 2 is an average date. E. C. Stakman, in charge of rust surveys for the Division, reports that during the last week of April light infection of stem rust was observed in Texas as far north as the Dallas area. There appeared, at that time, little prospect of any damaging increase in any of the areas inspected, except for a section northeast of Dallas where crop growth is rank. According to I. M. Atkins, of the Bureau of Plant Industry, a light infection of stem rust, consisting mainly of single pustules, was observed in the area between Cleburn, which is southwest of Fort Worth, and McKinney, northeast of Dallas. Wheat development at that time ranged from heading to flower in the Fredericksburg-Johnson City section north of San Antonio. This is about normal development.

Field operations expanded in Colorado during April.--According to E. A. Lungren, in charge of barberry eradication in Colorado and Wyoming, 81 men were employed on control work in the San Juan Basin during the last pay period in April. Further expansion was to begin on May 1, when crews were requisitioned in La Plata and Montezuma Counties. For the next 2 to 3 months, men employed on the F. A. project in these counties will be assigned to recheck work. The following table shows the number of workers, by counties, employed in Colorado as of May 1.

County	Super-visors	Workers			Super-visors	Unskilled workers
		Skilled	Inter-med.	Un-skilled		
	Number	Number	Number	Number	Number	Number
F. A. Project:					State Project:	
Archuleta	1	3	0	27	0	0
Boulder	1	0	0	9	0	0
Costilla	1	0	0	22	0	0
Dolores	0	1	0	5	0	0
La Plata	1	3	1	11	1	21
Montezuma	0	1	0	8	0	0
Total	4	8	1	82	1	21

Fewer rust epidemics in Ohio in recent years.--When barberry eradication was undertaken in Ohio in 1918, grain crops were being damaged by stem rust to the extent of 851,000 bushels annually (5-year average, 1918-22). The eradication of more than 3,249,700 bushes since that time has brought about a steady decrease in losses from this cause. During the 5-year period 1935-39 the average annual loss was 235,000 bushels. Harry Atwood, State leader of barberry eradication in Ohio, comments on the frequency with which local epidemics of stem rust are encountered in Ohio, as follows: "During the early years of control work inspectors were confronted with stories, told by farmers, concerning the destructive character of the common barberry in their respective communities. An investigation usually confirmed the fact that the rust was actually present in quantities on the growing grain. The varying degree of rust severity in different parts of the infected fields was so evident that it was a simple matter to find the guilty barberries. Repeated observations were made during the growing season and maps prepared from the data obtained. These illustrated the progressive development of stem rust, the first appearance of rust on barberries; the date the first red rust appeared on nearby grains and grasses; the date that black rust first appeared; the rate of spread; and the severity of the rust at harvest time, including an estimate of the damage caused. The date upon which the first rust infection was found on barberry bushes in Ohio has ranged during the past 20 years from April 7 to May 10, and the date upon which rust was first found on grains and grasses during the same period has ranged from May 30 to June 15. These variations apparently are due primarily to weather conditions. In addition to preparing a detailed map, a case history of each local rust spread is prepared. The case history includes the location of the spread, the farmer's story of local rust outbreaks, history of the barberry location, comparison of yields and quality of grain produced in the same fields in the years before and after the barberries were removed, and the names and addresses of interested farmers in the community. These local epidemics have reached varying degrees of severity and extent. In one county alone, in a single year, losses from stem rust amounted to more than $50,000. The damage ranged from complete destruction of crops near barberry bushes to reduced yields and grain of poor quality in other parts of the county. As the barberry population has been reduced in the more important grain-growing areas of the State, fewer local epidemics of stem rust are encountered. A general light sprinkling of stem rust may be found in many wheatfields almost every year. This light sprinkling occurs late in the growing season and seldom does any damage. This may be caused by spores blown from the South, either directly from barberries or from rusted grain fields."

COTTON INSECT INVESTIGATIONS

Plot studies for cotton-insect control.--During the last several years workers engaged in making insecticide tests for control of several cotton insects have been using various-sized plots arranged in two different designs, namely, randomized blocks and Latin squares. It has been customary for the data collected on insect infestations and yields to be analyzed by the method of analysis of variance. Comparisons have been made of the criteria for evaluating an insecticide, plot designs, sizes of plots, and the experimental errors found, for the purpose of determining, if possible, the most desirable to use in future experiments. These data have been compiled by R. C. Gaines from published and unpublished reports of the experiments conducted by F. F. Bondy and C. F. Rainwater at Florence, S. C.; by C. S. Rude at Gainesville, Fla.; by R. L. McGarr at State College, Miss.; by R. C. Gaines and M. T. Young at Tallulah, La.; by K. P. Ewing at Port Lavaca and Waco, Tex.; by J. C. Gaines and R. W. Moreland at College Station, Tex. (in cooperation with the Texas Agricultural Experiment Station); and by T. P. Cassidy at Mesa, Ariz. The unit of measurement for boll weevil infestation was the average percentage of squares punctured per plot. After treatments were begun, records of percentages of squares punctured were made at regular 5- to 7-day intervals. These records were averaged. Yield was the number of pounds of seed cotton produced per plot. The boll weevil infestations and yields were used in the analysis of variance. A brief summary of the investigations is as follows: Often boll weevil infestation records, based on the value of F, show highly significant or significant differences between the means of treatments, whereas yield records show no significant differences among the means of treatments. In 45 experiments the standard errors as percentage of the general means for boll weevil infestations ranged from 1.3 to 16.9 and for yields from 0.5 to 6.6. The standard deviations as percentage of the general means for infestations ranged from 7.6 to 63.0 and for yields from 2.4 to 28.5. Errors and deviations for infestations, when averaged, were 2.7 times greater than the errors and deviations for yields. A larger variation was found in the records of infestations than in yields. The infestations are samples of a biological population which are directly influenced by insecticides and subject to variation by the experimenter in making the records. Yields reflect the ability of the soil to produce under a given insecticide treatment and from an economical viewpoint are essential before final decision can be made as to whether or not insecticides against cotton insects are profitable. In randomized blocks standard deviations for yields were somewhat reduced as the plots were increased from 1/30 to 1/4 acre in size, whereas the deviations for infestations were somewhat larger in the 1/4-acre plots than in the 1/30-acre plots. Both standard error and standard deviation in 1/45- to 1/10-acre plots in Latin squares were smaller than in plots of 1/30, 1/10, and 1/4 acre in size in randomized blocks. Boll weevil infestations in plots treated with calcium arsenate at Tallulah, La., in 1938 and in 1939 were held as low in 1/30-acre plots as in plots containing 1/4 and 3/4 acre.

Boll examinations for bollworm injury in Arizona.--T. P. Cassidy, Tucson, Ariz., reports concerning studies made to determine the damage caused by the bollworm (Heliothis armigera Hbn.) in 1939 in the 6 leading cotton-growing counties of Arizona. Beginning the middle of September and continuing to the end of November, collections were made of 500 bolls from each of 70 fields of short-staple cotton, or 35,000 bolls; and 27,500 bolls from 28 fields of Pima or long-staple cotton, making a total of 62,500 bolls. Of the 35,000 short-staple bolls examined 505, or 1.44 percent, were bored by bollworms, and of the 27,500 long-staple bolls examined 217, or 0.79 percent, were bored. Tabulation by counties is as follows:

County	Bolls bored	
	Short-staple cotton	Pima, or long-staple cotton
	Percent	Percent
Maricopa	0.31	0.32
Graham	.65	.30
Pinal	.65	.32
Pima	4.00	1.36
Santa Cruz	5.80	2.65
Yuma	.93	None grown

These examinations agree with others made in previous years. No explanation is suggested as to why the bollworm should be more serious on cotton in Santa Cruz and Pima Counties than in the other counties. However, the fact that there are less cotton and other cultivated crops in Pima and Santa Cruz Counties might cause the moths to concentrate in the cottonfields of these counties. It is of interest to note that the 2 counties where bollworm injury is highest are the counties where injury to cotton bolls by hemipterous insects is lowest. These studies indicate the relative abundance and damage by bollworms to cotton in the different counties of Arizona but do not indicate the total damage, as no record was made concerning the number of squares destroyed or of injured bolls that dropped from the plants.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Condition of cotton crop in southern Texas and lower Rio Grande Valley of Mexico.--The greater part of April was unfavorable for the development of the cotton crop in southern Texas and the lower Rio Grande Valley of Mexico. While rain was received in that region during the latter half of March, high winds which followed dried out the moisture very quickly, and damaged the small cotton plants greatly. In order to shorten the growing period and create a more uniform fruiting of the cotton crop in the lower valley counties, the State issued regulations restricting cotton planting in that area to the period February 20 to April 1 and this period was later extended to April 20, on account of extreme drought conditions. Owing to these adverse circumstances, very little planting was done, except on irrigated land, until the last few days in March. This activity was carried on with unprecedented speed during the first 2 weeks in April, and by the 20th all cotton acreage had been planted. As a result of insect damage and other adverse factors, numerous requests for permission to replant began reaching State and Federal officials following expiration of the planting period. In response to this demand, the Commissioner of Agriculture issued a statement on April 24, granting permission to growers to replant cotton where previous 1940 plantings had been destroyed under conditions beyond the farmer's control. At the end of April, 69 special permits had been issued to replant approximately 786 acres. Cotton planting was also practically completed on the Mexican side of the Rio Grande during the first 2 weeks in April, although only a small acreage in that region was subject to a restricted planting date. Practically all cotton acreage in the Coastal Bend district had been planted by the middle of April but, owing to unfavorable conditions, much of it died out and had to be replanted. In the greater part of that district cotton plants are stunted on account of the drought, and the crop is later than usual for this period of the year.

Destruction of sprout cotton.--The destruction of sprout cotton in the lower Rio Grande Valley of Texas was continued throughout April, in an effort to maintain a host-free period for the pink bollworm until the blooming of the 1940 cotton crop. Following the rains in March, sprouts developed over practically the entire area. Preparation of the land for cotton planting reduced sprout cotton to a considerable extent; notwithstanding, it was necessary to maintain between 17 and 18 grubbing crews on this work during the greater part of the month. Toward the end of April it was exceedingly difficult to find sprouts in the advanced stage, and those found were very scattered and no further advanced than the 1940 planted cotton. In Starr County, along the Rio Grande, a few scattered cotton plants were found in a field that had been planted 7 years ago. The field had not been in cultivation since that time, and the surrounding area had grown up in brush. These plants were the largest ever encountered in the valley. One plant measured 14 inches in circumference just below the first limb, and the taproot of another measured 5 inches in circumference 1 foot below the ground. During the month sprout cotton was grubbed from 17,640 acres in the lower valley, making a total of 90,649 acres for the season. Most farmers over the area showed considerable interest in having their laborers remove all sprout cotton from fields as the cotton was being chopped. Contacts continued to be made with farmers in the Coastal Bend district during April in regard to removing sprout cotton, which was found in a few fields. Very satisfactory cooperation was given in most instances and efforts were made to destroy the plants before they fruited. The work of contacting farmers on the Mexican side of the Rio Grande, relative to the removal of stub cotton, was continued during April and grubbing crews operated intermittently in the Matamoros area.

Inspection in lower Rio Grande Valley.--Trap plots of cotton were planted on both the Mexican and American sides of the Rio Grande around the middle of January, with the expectation that they would come into fruiting considerably in advance of the 1940 planted cotton and be so attractive to any emerging pink bollworm moths as to draw them away from commercial plantings. However, owing to extremely unfavorable growing conditions, the cotton in these plots is very little in advance of the planted field cotton. Examination of material from plots on both sides of the river during the last week in April gave negative results as to pink bollworm infestation. Systematic bloom inspection in 1940 field plantings in the lower Rio Grande Valley is expected to begin about the middle of May. In connection with the grubbing of sprout cotton on the Mexican side, a total of 436 forms was inspected during the latter part of April with negative results. However, inspection of additional material, found on 1939 cotton stalks in a field 14 miles west of Matamoros, yielded 1 pink bollworm larva. Examination of the small amount of okra available during the period showed no pink bollworm infestation.

Pink bollworm program in Don Martin area.--During the latter part of April the Mexican Department of Agriculture took steps to inaugurate a pink bollworm control program for the Don Martin irrigation district at Anahuac, Nuevo Leon. Pink bollworm infestation was first found in that area during the latter part of the past year. There is a total of about 10,000 acres of soca cotton in that district. About half of this cotton is under cultivation and the remaining half consists of abandoned fields, on which a very poor stand of soca exists. The first step in the program being undertaken by the Defensa Agricola calls for the removal of all soca cotton in that area, and operations to this end were expected to begin early in May.

Situation in the Big Bend.--The control program being followed this year for the Presidio area of the Big Bend is similar to the "Two-Year Plan" employed with such outstanding success in 1938 and 1939 in reducing the heavy pink bollworm infestation in the Big Bend. Cotton planting started in practically all sections of the Presidio area on April 20, the date established by the State Department of Agriculture for the beginning of this activity, and no violations of this regulation occurred. Planting went forward vigorously during the last 10 days of April, with the result that a more uniform planting of the crop was obtained in that area than ever before. At the close of the month practically all of the acreage in the Presidio vicinity had been planted. In connection with delayed planting, the prevention of the fruiting of sprout cotton is essential. These combined measures create a host-free period until the highest peak of pink bollworm moth emergence has been completed in that area, as cotton planted after April 20 will not produce blooms before the middle of June. Scattered sprout cotton was grubbed from 8 or 10 acres of land during the latter part of the month. This phase of the program will demand considerable attention throughout May and the early part of June.

Destruction of stub cotton in Arizona.--One of the principal measures in the pink bollworm control program for Arizona is the regulation promulgated by the Secretary of Agriculture through the Agriculture Adjustment Administration requiring the destruction of stub cotton throughout that State. Exceptional cooperation has been received from growers in carrying out this control measure, and indications are that all requirements will be met by the deadline of May 10. The past winter and spring have been exceptionally favorable for 1939 stub cotton growth, which would have resulted, in many instances, in a complete stand for continued cultivation had it not been for the A. A. A. regulation. The elimination of stub cotton aids in the important objective of creating a host-free period during the peak of spring emergence of moths.

Wild-cotton eradication in Florida.--A program for the eradication of wild cotton in southern Florida was inaugurated in 1932. At that time a heavy infestation of the pink bollworm existed in this wild cotton, and this program was undertaken in an effort to prevent the spread of this insect into the cotton-growing areas of the United States. Good advancement was made in this program in all areas during April. Wild-cotton eradication in the Cape Sable area, which has been carried on during the present season with the aid of C. C. C. enrollees, was concluded around the latter part of the month, and this area was left in very good condition. The completion of the work in the Cape Sable area terminated the cooperative efforts of the C. C. C.

organization with this Division, and toward the end of April the personnel was withdrawn, although a number of the camp buildings were left at Cape Sable. Wild-cotton work was also carried on in the Bradenton, Fort Myers, and Keys subdistricts. Second cleanings for the season were completed in most of the areas during April and third cleanings were begun.

Thurberia-plant destruction.--A program for the destruction of the Thurberia plant was begun in the Tortillita and Santa Catalina Mountains of southern Arizona in 1935, following the discovery that this plant, which is closely related to cotton, was heavily infested with a boll weevil. This cotton insect was making its way to adjacent commercial plantings, from which it might have spread to other cotton-producing sections of the United States. The second coverage of the western slopes of the Santa Catalinas has been under way for several months, and an unusual number of Thurberia plants are being found in that part of the area now being worked. During April, 4,440 acres were covered and 136,884 Thurberia plants were destroyed.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Vegetable weevil larvae injure flue-cured tobacco in plant beds.--Norman Allen, of the Florence, S. C., laboratory, reports the occurrence of coleopterous larvae, tentatively identified as the vegetable weevil (Listroderes obliquus Klug.) in tobacco plant beds during April and May. Although injury by these larvae was confined to a relatively small number of plants on the margins of the beds, it appears that as this insect is of known economic importance it must be considered a potentially important tobacco pest. F. S. Chamberlin, of the Quincy, Fla., laboratory, had previously reported this species as injuring tobacco plants in beds but, so far as known, this is its first occurrence on tobacco in South Carolina or on flue-cured tobacco at any place.

Relationship between eastern and western species of Limonius.--H. P. Lanchester, of the Walla Walla, Wash., laboratory, reports that in the course of a comparative anatomical study of the larvae of two eastern and four western species of Limonius, it was found that they are all distinct and can be separated one from the other on clear-cut anatomical characters. The eastern species, L. agonus Say and L. dubitans Lec., are more closely related to the western species, L. canus Lec. and L. californicus (Mann.), than they are to L. infuscatus Mots. or L. subauratus Lec. Relationship between the two eastern species is apparently closer than between their most nearly related western species. Each of the two eastern species is readily separated from the other, and also from the four western species, on the basis of good anatomical characters.

Relation shown between density of population of different species of wireworms and cropping systems.--E. W. Jones, Walla Walla, reports that a wireworm census in 70 fields of the garden district of Walla Walla during the quarter ended March 31, disclosed that cabbage and carrot fields had high average populations of the Pacific coast wireworm (Limonius canus Lec.), whereas comparatively low populations of this species occurred in sugar beet and alfalfa fields. On the other hand, the larvae of the sugar beet wireworm (L. californicus (Mann.)) were comparatively numerous in sugar beet and alfalfa fields. The predacious wireworm (Hemicrepidius carbonatus Lec.) was numerous in rhubarb beds and appeared to be associated with correspondingly low numbers of L. canus. This predator was also abundant in alfalfa, carrot, and cabbage fields. Occasional individuals of L. californicus were found in field of rhubarb, asparagus, onions, and cabbage. The western field wireworm (L. infuscatus Mots.), which is ordinarily unimportant in garden districts, was fairly abundant in rhubarb fields. The meadow wireworm (Dalopius lateralis Esch.) was found in rhubarb plantings only, but Drasterius dorsalis Say was abundant in alfalfa and sugar beets. Cardiophorus tenegrosus Lec. was present in rhubarb, asparagus, onion, and cabbage fields.

Various sprays control cyclamen mite on snapdragon.--Floyd F. Smith, of the Beltsville, Md., laboratory, reports that, among 11 spray combinations applied to snapdragons for the control of the cyclamen mite (Tarsonemus pallidus Banks), lime-sulfur (1-200), a commercially prepared insecticide containing lauryl thiocyanate, white oil emulsion, and tartar emetic with glycerin were the most effective. Four applications of the spray combinations were made during December 1939 and January 1940 to snapdragon plants infested with T. pallidus. Their efficiency was compared on the basis of (1) plant injury by sprays, (2) injury by mites, and (3) population of mites on infested parts. Preliminary observations indicated that 1 application of most of the materials used was slow in action or ineffective. The final estimate of efficiency in control was based on the reduction of mite infestation on slightly injured tips, it being assumed that the severely injured tips could be removed by hand. A commercially prepared material containing cyclohexylamine diluted at the rate of 1-600, without additional spreader, severely injured young growth and cannot be recommended for spraying snapdragons, even though achieving a control of 90.4 percent of the mites. Ammonium polysulfide and sodium polysulfide at dilutions of 1-200, with a spreader, gave low percentages of control of 7.3 and 13.5 percent, respectively, and also were objectionable because of their odor.

Aphis gossypii transmits necrotic fleck of lilies.--Mr. Smith also reports that during the course of experiments on the transmission of necrotic fleck, a serious virus disease of lilies, it was found that the cotton or melon aphid (Aphis gossypii Glov.) transmitted the disease to approximately 65 percent of the exposed plants and was apparently the only efficient vector among the five species of aphids tested.

INSECTS AFFECTING MAN AND ANIMALS

Cube-sulfur dip effective against chicken lice.--Seventeen grown Buff Orpington hens, 3 large capons, and 11 young baby chicks were thoroughly dipped in cube-sulfur dip (1 pound cube-5% rotenone, 10 pounds 325-mesh sulfur, and 100 gallons water) on April 2. Several examinations, made from the seventh day after dipping to April 30, have not revealed a single live louse. There was no injury. The fluff of the feathers, after drying out, looked better than ever and the chickens were fat and healthy.

Diphenylamine and diphenylene oxide dissolved in benzol show promise in control of wool worms.--More than 100 sheep, experimentally infested with Phormia regina Meig., were treated with 15 percent diphenylamine or diphenylene oxide dissolved in benzol, or the same materials to which was added a certain wetting agent, such as turkey red oil. The formulae used combine a larvicide and protector against reinfestation in 1 treatment. The benzol acts primarily as a larvicide and carrier and, upon evaporation, leaves the chemical to protect the infested area against reinfestation. Preliminary studies in 1939 showed the treatment to be very promising, and tests so far this season substantiate these observations. Of the approximately 100 cases treated, only 1 treated animal (treated with diphenylamine-benzol) has become reinfested, whereas 21 of the 24 check animals treated with benzol became reinfested, all within 24 hours after treatment. The addition of a wetting agent, such as turkey red oil, results in faster kill of larvae, and causes the chemical to be deposited in finer particles and closer to the skin of the sheep which, under certain conditions, may be an advantage.

Effect of high temperatures on mosquito eggs.--Eggs of *Aedes vexans* Mg. and *A. lateralis* Mg. in moist soil were placed at 92° F. for 44 hours. When they were removed from the soil and placed in asparagine-phosphate solutions they hatched normally. Check eggs placed in tap water did not hatch. Eggs of these *Aedes* were also placed in moist soil and held at 98° for 6 days. In these tests *A. vexans* hatched normally but only 35 percent of the *A. lateralis* eggs hatched in asparagine-phosphate solutions. No hatch of either species occurred in tap water.

FOREIGN PLANT QUARANTINES

Forest litter and green-sphagnum insectary as packing.--A shipment of lily-of-the-valley pips from Denmark was packed in forest litter and green sphagnum, which proved to be a good insectary when examined on January 11 at New York. Most of the insects collected have been determined or partially determined now and it is found that more than 50 genera are represented in this collection of insects from 1 lot of packing material. The list of insect determinations follows: *Acrotrichis* sp., *Agonum mulleri* Hbst., *Aleochara* sp., *Anacaena globulus* Payk., *Anthocoris nemorum* (L.), *Apion flavipes* Payk., *Atomaria ruficornis* Marsh., *Atomaria* sp., *Cantharis* sp.?, *Cardiola obscura* Grav., *Cassida flaveola* Thunb., *Cercyon melanocephalus* L., *Cercyon* sp., *Ceutorhynchus atomus* Boh., *C. contractus* Marsh., *Chaetocnema concinna* Marsh.?, *Chrysolina brunsvicensis* Grav., *Corizus parumpunctatus* (Schill.), *Crambus* sp., *Cryptopleurum atomarium* F., *Cyphon* sp., *Drymus sylvaticus* (F.), *Ectobia lapponica* (L.), *Eurydema oleraceum* (L.), *Gyrohypnus* sp., *Hypera arator* L., *H. nigrirostris* F., *Lagynodes* sp., prob. new, *Lasius* sp. (*niger* group), *Liogma* sp., *Lygus pratensis* (L.), *Melanophthalma* sp., *Meligethes aeneus* (F.), *Metabletus truncatellus* L., *Mycetoporus* sp., *Notiophilus palustria* Dufts., *Oliarus* sp., *Olibrus* sp., *Omalium* sp., *Phaeogenes minutus* Wesm.?, *Phaeogenes* sp., *Philonthus* sp., *Phyllotreta undulata* Kutsch., *Propylaea quatuordecimpunctata* (L.), *Quedius* sp., *Sciaphilus muricatus* F., *Scydmaenus* sp., *Sphaeridium bipustulatum* F., *Stenus* sp., *Strophosoma melanogrammum* Först., *S. rufipes* Steph., *Tachinus* sp., *Tachyporus chrysomelinus* (L.), *Tachyporus* sp., *Theroscopus pedestris* (Grav.), *Thyreocoris scarabaeoides* (L.), *Trachyphloeus aristatus* Gyll., *Trapezonotus arenarius* (L.), *Troilus luridus* (F.), and *Xantholinus* sp.

Champagne offered for orchid entry.--As the passengers were disembarking from the American S.S. *Sixaola* at New Orleans on March 14, 1940, the second steward informed the plant quarantine inspector that he believed a passenger was bringing orchid plants off. This information was given to the deputy collector of customs in charge of the baggage inspection, and when the Customs inspector got the declaration he was asked if the passenger had any plant material, to which she admitted that she had some orchid plants at the beginning of the voyage, but had thrown them in the ocean. Despite her efforts to appear calm and extremely sophisticated, there was an air of uneasiness apparent. The inspector proceeded with the examination, and in a short time found one orchid plant packed in her clothing. Toward the end of the inspection, six more orchid plants were taken from her personal effects. Neither her zeal nor her artifice had yet disappeared, however, and she then told the inspectors that if they would forget the plants, she would entertain them at a champagne party that evening. Instead of buying champagne, however, she was assessed a fine of $7 by the Customs, and the plants were seized and destroyed. This passenger gave the plant quarantine inspector some very interesting information, among which was the statement that no foreign country had any plant pests or diseases that the United States did not have already! She was informed that, had she followed the proper procedure, she could no doubt have had the plants with little expense or trouble. The plants were from Guatemala.

Infested fig cuttings from Italy.--A shipment of 11,000 fig cuttings arriving from Italy, carried in 18 large cases having a total weight of over 2½ tons, destined for ultimate planting at Santa Clara, Calif., was found on inspection at San Francisco to carry 41 species of insects, mites, snails, and other animals of which 9 were of known or potential major economic importance and either not known to occur or of very limited distribution in this country. Included in the latter group were numerous larvae in all stages representing 2 species of cerambycid wood borers (*Pogonocherus hispidulus* Pill.(?) and (?) *Cerambyx* sp.); a general infestation of scolytid bark beetles (*Hypoborus ficus* Er.) present in all stages; thousands of eggs with numerous newly hatched crawlers of a psyllid (possibly *Homotoma ficus* (L.)); a general infestation of ficus scale (*Lepidosaphes ficus* (Sign.)) present as adults with numerous eggs; thousands of eggs of a red mite (*Tetranychus* sp.); numerous adults representing 2 species of plant bugs of the family Lygaeidae (*Tropistethus fasciatus* Ferr. and *Plinthisus brevipennis* Latr.); an immature stage of mealybug (*Pseudococcus* sp.); and an adult curculionid weevil (*Mecinus circulatus* Marsh). The shipment was released only after being subjected to vacuum fumigation using methyl bromide and intensive reinspections at 15- and 25-day intervals following treatment to determine that the treatment had been effective against all stages of all of the pests found.

Delicious (?) larva.--A joint of sugarcane intercepted at Honolulu bore the following inscription: "We cut this from a sugarcane plantation, break open and chew on a piece--happy sweet tooth." An examination of the item showed the juicy section to have been entirely eaten by a well-developed larva of *Rhabdocnemis obscurus* Boisd. still present.

Pink bollworm by truck.--*Pectinophora gossypiella* (Saund.) was found in one of three cottonseeds on the bed of a truck from Mexico entering at El Paso on February 22.

One seed, three fruitfly larvae.--A small white sapote seed on the platform of a truck entering El Paso from Mexico on March 31 was found to contain three larvae of *Anastrepha ludens* (Loew.).

Entomological interceptions of interest.--A living larva of the papaya fruitfly (*Toxotrypana curvicauda* Gerst.) was intercepted at New York on February 19 in a bag containing papaya fruits in baggage from Puerto Rico. Two living larvae of the phaloniid *Lorita abornana chatka* Busck were taken at Nogales, Ariz., on December 16, 1939, in a small hot pepper in cargo from Mexico. A living specimen of the cicadellid *Draeculacephala minerva* Ball arrived at El Paso, Tex., on January 30 on a lettuce leaf in baggage from Mexico. Living adults of the mordellid *Mordellistena cattleyana* Champ. were found at Washington, D. C., on January 22 in an orchid leaf in express from Colombia. Eleven larvae of the East Indian bean pod borer (*Maruca testulalis* Geyer) were intercepted at New Orleans, La., on December 27, 1939, in string beans in ship's stores from Haiti. A living larva of the chrysomelid *Psylliodes chrysocephala* L. was found at Mobile, Ala., on January 29 in a turnip in ship's stores from Morocco. Living specimens of the coccid *Conchaspis angraeci* Ckll. were intercepted at San Juan, P. R., on August 30, 1939, on orchids in baggage from Dominican Republic. A living adult of the chrysomelid *Metriona tuberculata* (F.) was taken at Galveston, Tex., on January 29 on a banana fruit in cargo from Guatemala. A living specimen of *Lygaeus vittiscutis* Stal arrived at Laredo, Tex., on December 4, 1939, in head lettuce in baggage from Mexico. A living adult of *Cerotoma atrofasciata* Jac. was intercepted at San Francisco on January 3 on an orchid (*Oncidium cavendishianum*) in cargo from Guatemala. H. S. Barber reports that this chrysomelid is a serious enemy of beans in Guatemala.

Pathological interceptions of interest.--*Amphichaeta* sp. was intercepted on tree peonies from Japan in shipments arriving at Seattle during December and January. *Aphelenchoides subtenuis* (Cobb) Goodey was intercepted on October 5, 1939, at New York in a narcissus bulb from Holland. *Botrytis allii* M. T. Munn was intercepted on onions from Mexico on April 1 at El Paso. *Cercospora musae* Zimm. was found on April 11 at New York on banana leaves accompanying a large cargo shipment of bananas from Colombia. *C. nasturtii* Pass., a new record for Hawaii, was found on watercress in the field near Honolulu on March 11. *Cercosporella euonymi* Erikss. was found on *Euonymus* sp. from Japan in quarters at Seattle on October 24, 1939. *Colletotrichum graminicolum* (Ces.) Wils. was found on April 8 at New York on leaves of grass from Arabia. *Coniothyrium* sp., with spores smaller than in either species reported on orchids, was intercepted on December 11, 1939, at San Francisco on an *Epidendrum* sp. from Mexico. *Epichloe typhina* (Pers.) Tul. was found on April 8 at New York on *Festuca* sp. leaves in hay from Arabia. *Eutypa bambusina* Penz. & Sacc. was found on March 6 at New York on bamboo slats from Netherlands East Indies. *Gloeosporium cattleyae* Sacc. & D. Sacc. was intercepted on January 2 at San Francisco on *Cattleya gigas* from Colombia. *G. cymbidii* Verpl. was intercepted on November 28, 1939, at San Francisco on *Cymbidium* sp. from Japan. *G. laeliae* P. Henn. was intercepted at the same port on November 22, 1939, on *Laelia anceps* from Mexico. *Macrophoma oncidii* P. Henn. was intercepted on orchids from Colombia on January 9 at New York. Mosaic was found to be present on *Lilium harrisii* in baggage received from Bermuda at New York on April 25 by steamer and on April 28 by clipper. *Macrosporium* sp. with spores smaller than those of *M. camelliae* Cke & Mars. was intercepted at Seattle on December 21, 1939, on *Camellia japonica* from Japan. *Papulospora parasitica* (Eid.) Harz was intercepted on begonias on March 28 and on *Lilium henryi* on March 29 at New York in shipments from Holland. *Papulospora* sp., apparently the primary agent in a rot of onions from Mexico, was intercepted on April 1 at El Paso. *Phlyctaena ranunculacearum* v. H. was intercepted on January 6 at San Francisco on *Paeonia moutan* from Japan. *Phoma tenuis* Pass. was intercepted on *Camellia japonica* on December 22, 1939, at San Francisco. *Phomopsis perniciosa* was intercepted on April 20 at New York on *Prunus subhirtella sendaica* from Holland. *Phomopsis* sp., no species reported on host, was intercepted at San Francisco on January 6 on *Paeonia moutan* from Japan. *Phyllachora trifolii* (Pers.) Fckl. (*Polythrincium* stage) was intercepted on April 8 at New York on clover in hay from Arabia. *Phyllosticta camelliaecola* Brun. var. *meronensis* Bubak was intercepted on December 22, 1939, at San Francisco on *Camellia japonica* from Japan. *Physalospora cattleyae* Maubl. & Lasn. was intercepted on January 3 at San Francisco on *Cattleya* sp. from Guatemala. *P. japonica* Togashi on *Camellia japonica* from Japan was intercepted on December 22, 1939, at San Francisco. *Septoria lactucae* Pass. was found on April 29 at New York on lettuce in stores from Brazil. *Uredo erythroxylonis* Graz. was common on *Erythroxylon coca* leaves in cargo from Peru inspected at New York on April 4. *Uromyces trifolii* (Hedw., F.) Lev. was found on March 14 at New York on shamrock from Ireland. *Ustilago grandis* Fries was found on April 6 at New York on *Phragmites* sp. from Holland.

DOMESTIC PLANT QUARANTINES

The grasshopper hatch.--In New Mexico the hatch of the migratory range 'hoppers began on April 11 in the Dunlap area along the De Baca-Chaves County line and was completed by the close of the month. Little migration from the egg beds had occurred, and some of the egg beds showed an 80-percent reduction in population from last year. The hatch in Quay County, N. Mex., was also practically completed by the close of April. In the Oklahoma-Texas Panhandle, species with migratorial tendencies began to hatch on April 14. In 1 small locality along the Frisco Railroad in Rockwall County, Tex., first and second instars of the differential 'hopper numbered from 5,000 to 8,000 per square yard. In parts of Colorado, Kansas, and Utah, various species were starting to hatch from April 25 through the remainder of the month. In the northern Great Plains no hatching was found to have taken place. Eggs of many species were in the coagulated and eyespot stages.

Surveys of grasshopper eggs.--Spring egg surveys in eastern South Dakota showed severe infestations of the differential and two-striped species, with indications of a prolonged hatching period. A cross-section egg survey was made in Hill County, in north-central Montana, and the number of egg pods found checked with the fall egg survey. "Never before," Project Supervisor R. L. Shotwell stated, "have I found such a uniformly high count of egg pods for an entire county.* * * Idle land covered with Russian-thistle and mustard have infestations that range from threatening to severe."

Development of crickets.--Mormon crickets in the first and second instars were present in Gilliam County, Oreg., by April 6. Coulee and Mormon crickets were found together in almost all instances in Jefferson and Wasco Counties, Oreg., in the early part of April. The coulee crickets were in the sixth instar on April 14 and the Mormon crickets in the fourth. By April 27 the coulee crickets were found only in the lowlands. The weather was rainy and cool and no general migration had occurred. Mormon crickets were observed migrating in Baker County, Oreg., on April 13, and in Franklin County, Wash., on April 20. The latter infestation appeared heavier than last year. In three counties in Utah, Mormon crickets were found in the first to fourth instars on April 17 and 19. Hatching in Wyoming was almost complete by the close of April. In Montana a 50-percent hatch had occurred in Big Horn County by April 20.

Getting ready for the 'hoppers and the crickets.--Meetings of the State leaders' grasshopper control committee, and of the field supervisors of the 'hopper and cricket control projects, were held in Denver on April 26-28, with Bureau representatives from the Washington and Denver offices. Programs for the 1940 crop season were discussed, and the plan of operations was worked out. Memoranda of understanding between the Bureau and the States have been drawn up and have been signed by officers of 14 States. In April supervisors set up the field and area offices, assisted State leaders with organizational meetings, checked bait materials in storage, and arranged for local transfers of such materials. Government vehicles have been moved out of storage, and 10 additional power bait spreaders have been constructed and distributed for use on Mormon cricket control.

Grasshopper baiting.--Grasshopper baiting was carried on the latter part of April in Kern and Fresno Counties, Calif., and in four counties in New Mexico. By the close of April materials were on hand in the majority of the various States in sufficient quantity to allow mixing stations to begin operations as soon as the need for baiting arises. Additional bait materials were being ordered and shipped to counties in the infested States as rapidly as requisitions from State leaders were received.

Mormon cricket control.--In several counties in Oregon, Nevada, Washington, and Wyoming, control operations had been initiated and all measures had been taken to rapidly expand the program as the need for control increases in the infested States. In Oregon 20 men employed on Federal funds were hand-dusting crickets in Baker County during the week ended April 27. Indian crews erected metal barriers and hand-dusted crickets on the Warm Springs Indian Reservation. Metal barrier was used effectively in stopping cricket migrations in the canyons. Baiting and dusting have also been highly effective, considering the weather. Power-dusting was begun on April 24 in Malheur County, Oreg.

Armyworms in the Southwest.--An outbreak of armyworms with reported damage of 30 to 35 percent occurred in the latter part of April in Curry and Quay Counties, N. Mex., and was reported as occurring generally in wheatfields throughout 13 counties in the Panhandle area of Texas.

Peach mosaic inspection under way.--The inspection of peach orchards for the peach mosaic disease went forward in April in California, Colorado, Texas, and Utah, cooperatively with the States, and some inspections were made along with tree removal work in Arizona and New Mexico. Special attention was given to nursery and budwood properties and surrounding zones within a mile thereof, in order to cover these areas by May 15, as provided in the standard State quarantines. In Utah the first inspection this season in Washington County, totaling over 1,200 properties, resulted in finding but 13 mosaic trees, approximately 95 percent less than the number found infected on the first inspection in 1939. Nine Bureau and nine State inspectors conducted the work in that county, and a second inspection is under way. Two men are carrying on the work in Grand County, Utah. In Texas results of the work completed in Tarrant County show infection on 21 properties for the first time, and no infection on 13 properties infected in 1939, nor on 20 infected in 1938 or 18 infected in 1937. Four mosaic trees were found in a nursery environs in Dallas County. Evidence of natural dissemination of peach mosaic was observed in a number of instances in eastern Texas. In tree-removal work in San Saba County, mosaic was found on wild peach trees, intermingled with wild plums. The Colorado work has been confined mostly to the heavily infected localities in Mesa County and it is observed that the heaviest infection found to date has been on properties on which symptomless carriers of the disease have been growing for some time. Cooperation by growers in the State is especially noteworthy this year. The 14 Bureau and State inspectors were assisted by 13 W. P. A. inspectors in Colorado. The California work included the removal of 534 diseased trees, and the inspection of Imperial County, in which no mosaic disease was found. Relief laborers took out abandoned and escaped trees during the month in 10 States infected with the phony peach or peach mosaic disease.

Peach mosaic and phony peach disease found on same tree.--In tree removal in San Saba County, Tex., in March, a peach tree was found infected with both mosaic and phony disease. This is the first instance known in which both diseases have been found on the same tree under natural conditions. Root tests made for the phony disease in the laboratory of the Bureau of Plant Industry at Brownwood, Tex., gave a positive reaction.

Peach-tree removal policy in California.--In order to expedite the removal from Riverside and San Bernardino Counties, Calif., of peach trees whic have been found infected with the peach mosaic disease in the last 4 years, a policy was recently adopted by the officers of that State, working jointly with this Bureau, under which it was proposed that all diseased trees should be promptly removed from the lightly infected districts of these counties. To that end, growers have been requested to sign waivers on diseased trees remaining on properties in the lightly infected sections, the State serving notices upon owners or occupants of premises who refuse to sign waivers. As a result of this policy, all mosaic trees had been removed from 71 percent of the properties in the lightly infected areas, at the close of April. There remain to be cleared 27 properties in 24 sections of the lightly infected areas. Two of the 34 heavily infected sections have also been cleared. It is believed that the hazard of spread of infection from the heavily infected areas, which are extremely concentrated, is much less than from the lightly infected, widely distributed, areas on which trees are scattered.

Egyptian alfalfa weevil survey completed.--As a result of the intensive survey just completed by approximately 15 men, under the leadership of H. T. Rainwater, infestations of the new species of alfalfa weevil, *Hypera brunneipennis* (Boh.), were found to extend about 4 miles west and 10 miles south of Yuma, Ariz., and to exist 2½ miles northwest along the highway near Winterhaven, Imperial County, Calif. Another infestation was found 7 miles northwest of Winterhaven near Bard, Calif. One infested alfalfa field was found at the end of the South Gila Valley near Yuma and 1 field at the northern end of North Gila Valley, near Laguna Dam, approximately 4 miles from the infestation near Bard. In addition, an infestation was found in the Salt River Valley near Tempe, Ariz. Intensive scouting was conducted in the alfalfa-growing areas radiating from Yuma, Ariz., and in the adjacent agricultural region in Imperial County, Calif., and general scouting was conducted throughout southern California south of the Tehachapi Range, particularly in the Imperial Valley. In addition, some scouting was done in the San Joaquin Valley and in the 2 main alfalfa-growing regions of New Mexico and western Texas, comprising the Mesilla-El Paso Valleys, and the Upper Pecos Valley from Roswell, N. Mex., to Pecos City, Tex., without finding any weevils.

White-fringed beetle control work.--Under W. P. A. clearing projects in operation in April in Florida, Alabama, Louisiana, and Mississippi, nearly 2,000 acres of infested woodland and other areas were cleared, in preparation for control operations during the active period of the beetle. Terracing and fallowing operations were begun at points in Alabama and Mississippi. Tanks for storing large quantities of oil in the field for ready use in preparing herbicides were placed at strategic points in all areas except the large cities, where truck deliveries can be obtained. Sprayers, dusters, and other equipment needed for the program have been conditioned and placed at several field points. The first instances this season of damage by larvae of the white-fringed beetle were reported as occurring the week ended April 26, in cornfields at Glendale, Fla., and Drewry, Ala.

Louisiana quarantine on white-fringed beetle revised.--The State of Louisiana, in a revision of the white-fringed beetle quarantine regulations, which became effective May 1, requires certification for the movement of the host products to a specified eradication area from other parts of the regulated area. Observations indicate that the control measures of the past two seasons have considerably reduced the beetle population in the New Orleans area.

Sweetpotato weevil control and eradication.--April activities on the sweetpotato weevil project in Georgia were centered in Thomas County. The 5-mile zones surrounding the centers of active infestation were cleaned up with the assistance of State-sponsored W. P. A. laborers, and no sweetpotato tubers were allowed in any instance to remain stored therein. In the last 2 months 824 storage sites in the county have been cleaned in this manner. A weekly check was made in that county of 160 traps or baits placed around fields where infested sweetpotatoes were last grown. Only 1 adult weevil was taken. In Alabama growers and State-sponsored W. P. A. crews were very active in cleaning up properties infested with sweetpotato weevils, removing seedbeds that had been placed contrary to quarantine regulations, and removing host material, both wild and cultivated, from properties adjacent to infested premises. Trapping operations in Baldwin County, Ala., resulted in taking several adult beetles. The Mississippi work was confined largely to the eradication areas in 10 counties, where State W. P. A. laborers cleaned up storage banks and fields. Inspection in old infested area in Lawrence and Jeff Davis Counties has resulted in finding no weevils in the last 12 months. Nearly 300 traps were set in 10 Mississippi counties without capturing any adult weevils. The inspection of commercial storage houses in the Texas counties of Smith, Gregg, and Upshur, gave negative results. In Nacogdoches County, inspections were made for volunteer sweetpotato plants on all properties found infested in 1939, and storage bank inspections were completed. Eight beds were found to have been placed within 1/2 mile of a property known to have been infested in 1939. These beds were required to be moved to a distance of more than 1/2 mile, as required in State quarantine regulations. Thirteen Federal inspector and 8 State inspectors from Alabama, 2 from Georgia, and 1 each from Mississippi and Texas, made up the inspection force.

More Japanese beetle larvae intercepted.--Japanese beetle grubs were recently found in an uncertified freight shipment of 21 large nut trees intercepted at Pittsburgh, consigned to a point outside the regulated area. Special attention has recently been given freight shipments at Pittsburgh, therefore consignments of stone, cable reels, sawdust, and plant material were inspected in April. The number of express shipments intercepted at Pittsburgh during April in violation of Federal quarantine regulations, exceeded by approximately 50 percent the interceptions during the same month last year.

Transit inspection in Northeast.--Stations in the northeastern region, represented by New York, Boston, Buffalo, Philadelphia, and Pittsburgh, intercepted 118 shipments in April which involved 1 or more violations of 3 quarantines, consigned to 24 States and Puerto Rico. Twenty-nine shipments not complying with State nursery-stock-shipping regulations were also reported to the States concerned. Nearly 42,000 shipments and 48,000 waybills were inspected by a force of 12 inspectors. Data relative to the origin, volume, and time of day that sack mail is worked in the New York terminals, were completed early in May. This information was made available through the cooperation of the Railway Mail Service and city postal officials, who supplied the inspectors with sack labels for all parcel post worked over a 24-hour period. At 3 terminals, over 33,000 sacks of mail are worked by postal clerks in a 24-hour period. During the busy part of the day the hourly average is 2,700 sacks, or 32,000 parcels.

Transit-inspection work at Birmingham.--At Birmingham, Ala., the State nursery inspector and the Bureau transit inspector have a joint cooperative arrangement for the exchange of information on nursery stock shipments not certified in accordance with Alabama regulations, or not meeting Federal quarantine requirements. Arrangements have also been made at the Birmingham municipal airport for the transit inspector to receive notices of shipments of plants regulated by Federal quarantines.

Interesting interceptions.--Among the interceptions at St. Paul in April was a shipment of 1,000 Mahonia plants moving from Washington State to Virginia without the permit required under the black stem rust quarantine.

Citrus canker eradication.--One of the premises which was reworked by the Louisiana and Bureau inspectors during the recent joint inspection activities in that State was a property in Calcasieu Parish, where citrus canker was found 4 years ago. There were then over 15,000 Citrus trifoliata on the premises, and canker was found on but a single tree 4 years old. On the discovery all the 15,000 trees on the property were destroyed. Each year thereafter the place has been searched, and in 1937 and 1938 over 2,600 young seedlings of this species of citrus were found, inspected, and destroyed. Going back in April of this year, the inspectors found and destroyed over 100 such young trees on the property. However, no canker has been found on the property since 1936, and it appears that the persistent removal of the seedlings is an important feature of the program. Similar work was carried on in April around 12 properties where canker has been found in past years, the inspectors searching for the disease over a 5-mile radius of the premises. Six Bureau inspectors and 3 State men carried on the work for 2 months ending April 3, and inspected over 1,400,000 citrus trees in 16 parishes in southern Louisiana. No canker was found. Cooperative inspection in Texas included the strip-working of areas in Harris County, with the assistance of 60 relief employees, and inspection in a small town, Navasota, in Grimes County, 50 miles from Houston, where 17 large citrus hedges were found.

CONTROL INVESTIGATIONS

Blood-cell glycogen in Prodenia eridania Cram.--At the Beltsville, Md., laboratory, J. Franklin Yeager and Sam C. Munson have found that histochemically detectable glycogen normally occurs in certain of the blood-cell types of the southern armyworm (Prodenia eridania Cram.). No blood-cell glycogen occurs at the time of hatching, but appears later, provided the larvae feed. During the larval instars glycogen increases toward a maximum in the prepupal stage but, after pupation, it rapidly decreases to a low level. In the first larval instar and in the adult, blood-cell glycogen occurs infrequently. It decreases as a result of starvation and increases with ingestion of glucose. In their ability to store and to release glycogen under conditions of starvation and carbohydrate intake, these blood cells resemble the glycogen-storing liver cells of vertebrates. As high as 86 percent of the armyworm blood cells can be made to contain glycogen by feeding large amounts of glucose. Glycogen was detected by use of the methods of Bauer, Best, and Lugol, with the mucicarmine method of Mayer and the salivary counterproof method used as checks.

INSECTICIDE INVESTIGATIONS

New insecticides patented.--H. V. Claborn, formerly of this Division, and L. E. Smith were granted U. S. Patent 2,197,249 on April 16, 1940. This patent covers a number of fluorene derivatives, particularly 9-fluorenol, 9-fluorenone, and 2-aminofluorene as insecticides. 9-Chlorofluorene at a concentration of 4 pounds per 100 gallons of water gave approximately 50-percent control of the codling moth. Another compound, 9-fluorenone, at a concentration of 10 parts per million gave 91.3-percent kill of mosquito larvae. Fluorene is an aromatic hydrocarbon and should not be confused with fluorine, which is a gaseous element related to chlorine and is found in sodium fluoride, cryolite, and barium fluosilicate.

BEE CULTURE

Stimulation of broodrearing.--Frank E. Todd, Davis, Calif., reports: "In 1928 Whitcomb and Wilson published a study of the removal of pollen from liquids held in the honey stomachs of bees. The significance of this appears to have been overlooked until it was recently noted in this laboratory that when pollen was added to sirups and fed to colonies, a stimulation of egg laying followed within 24 hours. It is the common conception that queens are fed by nurse bees and therefore this reaction would not be expected, because the field bee removes and ingests pollen from the nectar carried in its honey stomach. The field bees may, therefore, be the source of the queen food. Tests have been made of the rapidity of pollen-grain removal, by action of the proventriculus, from sirups fed to bees. When about 1,000,000 pollen grains per cc. of sirup was fed, about 850,000 were removed by action of the proventriculus within 15 minutes, and nearly all the grains were removed in the course of 1 hour. This was in the case of bees caught at the feeder, i.e., nectar carriers. When bees were taken from a colony and then fed, it was found that certain bees removed very little pollen from the sirup, which suggests that age of a bee may be a factor. In order to feed larvae, nurse bees must carry pollen-honey mixtures, and studies have shown such bees to be younger than field bees and within fairly definite age limits. In addition to this it also appeared that sirup concentration affected the quantity removed. Removal was more rapid with thinner sirups. Field counts of pollen grains in nectars have shown them to vary widely by plant source species. The plum ran about 1,800 grains per cc., while a wild plant--fiddle-neck--ran 88,000. Stimulation of broodrearing is known to vary with the season, which may also be tied up with plant source and pollen content of the nectar."

Sugar and pollen in orange nectar.--Geo. H. Vansell, Davis, reports: "The production of nectar in each blossom of the two commercial orange varieties (Navel and Valencia) in California is copious. There is a tendency for individual trees to alternate seasonally from heavy to light bloom, but it is very noticeable that not all the trees or orchards have the same cycle of alternation, which results perhaps in ample blossoms for a honey crop each year. The buds begin to secrete nectar several hours before the petals unfold and continue to do so for some time afterward, the time depending to a large extent upon temperature conditions. When exposed to excessive temperature (around 95° F.) the blossoms, as well as the buds, quickly drop away, but at cool temperatures each blossom remains for over a week. The sugar concentration in the opening buds is evidently 15 to 16 percent. Unless the weather is conducive to evaporation of water, very little interest in this nectar is displayed by the bees. In 1939, in Orange County, a foggy, humid period during the blossoming season caused the nectar sugar to remain between 16 and 22 percent almost continuously. The bees then sought the richer nectars from mustards, wild radish, hoarhound, and other plants, in preference to the orange. On the other hand, in 1940 dry, warm air accompanied by gentle though strong winds resulted in nectar with an occasional concentration of 49-percent sugar in the older blossoms, the average for certain periods being 30 percent. Under this situation, the bees eagerly visited the orange trees, selecting the blossoms with the richest nectar, to store, at least on 1 day, a 20-pound nectar supply per colony. The hand-collected Navel nectar contained no pollen, whereas that from the Valencia had on an average of 18,000 pollen grains per cubic centimeter."

Use of pollen traps.--An interesting use of the pollen trap, an apparatus for removing the pollen loads from bees entering the hive, is reported by Warren Whitcomb, Jr., of the Baton Rouge Laboratory. He says: "The pollen trap was first devised to determine the amount of pollen brought in by bee colonies and as a means of experimentally limiting the amount of pollen in the hive. Later it was used for gathering large supplies of pollen for feeding experiments. More recently the pollen trap has been used for gathering pollen in areas where poisoning of bees by insecticides has been suspected and for collecting pollen from tung trees for use in pollination studies."

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Ball collection comes to National Museum.--The insect collection of E. D. Ball, which has recently been transferred to Washington, represents probably the most valuable single addition that has ever been made to the collections of auchenorhynchous Homoptera at the National Museum. Comprising some 70,000 specimens, largely North American representatives of the families Cercopidae, Membracidae, Cicadellidae, and Fulgoridae, the collection is of particular importance in taxonomic studies on these groups because of the large amount of type material included and the valuable biological information associated with many of the specimens. It is estimated that the collection contains representatives of 2,300 species, of which probably half are represented by either types or paratypes. The number of holotypes in the collection is approximately 650.

Weevils in sweetpotatoes from Africa.--The Division of Foreign Plant Quarantine inspectors at Philadelphia recently intercepted 27 living adults, as well as a large number of larvae and pupae, of Cylas in sweetpotatoes from Portuguese West Africa. One of these adults and several of the immature specimens belong to C. femoralis Faust, whereas the remainder of the lot represents a different species, which appears to be C. puncticollis Boh. The latter was heretofore represented in the National Museum collection by a few unnamed specimens, previously intercepted at Philadelphia, from Sierra Leone, Africa, and British West Africa. C. puncticollis Boh. was described from Senegal and has been reported from several other African localities. It seems to be, at times, decidedly injurious to sweetpotato, though it is not so important economically as the commoner and more widely distributed Cylas formicarius F. The several species of Cylas recorded as breeding in sweetpotato tubers all belong, so far as known, to a section of the genus characterized in part by the slender form of the body, and by the fact that the hind femur does not surpass, or only slightly surpasses, the tip of the abdomen. Of the species of the other section, characterized by a stouter body and a relatively longer hind femur, almost nothing is known biologically, though it may be reported that J. C. Bridwell reared one species of this group (evidently C. submetallicus Desbr.) from seed pods of Merremia chryseidis at Mangalore, India, in 1927.

Weevils received from Chile.--Among the miscellaneous insect material collected by P. A. Berry in Chile, and recently submitted to the Division of Insect Identification, were long series of three species of the weevil genus Pantomorus, namely, leucoloma (Boh.) (white-fringed beetle), godmani (Crotch) (Fuller's rose beetle), and an undetermined species near taeniatulus (Berg); and, in addition, moderate numbers of at least two species of Listroderes. The godmani specimens are of some interest as being the first extensive series from South America received for the National Collection, and tend to confirm the previous supposition that South America is the native habitat of this widespread species.

A geometrid new to United States.--J. F. Gates Clarke recently received for identification from John L. Sperry, of Riverside, Calif., two males of *Drepanodes epionata* Guenée (=*D. pionaria* Walker), a West Indian geometrid hitherto unrecorded from the United States. One specimen had been collected at Brownsville, Tex. ("23-X-35"), and the other in the Baboquivari Mountains, Ariz. ("27-IV-38").

Observations on a southwestern bedbug.--Through Miss M. O. Nolan, of the National Institute of Health, there were recently submitted for identification a number of small cimicids which were determined by H. G. Barber as *Haematosiphon inodorus* (Duges). A letter from Miss Nolan gives the information that these bugs were received from Mrs. John Van N. Dorr 2nd, wife of a member of a party from the U. S. Geological Survey who were mapping the Atolia tungsten mining district near Red Mountain, Calif. Mrs. Dorr writes: "We find them here in the wood of old mine shafts where they appear in hordes. They seem to be just coming out for the season since we have found them on the dumps where they were not to be seen a few weeks ago." She said it was necessary "to fight off the hundreds of bugs which wanted to make a free meal of us." Specimens were observed feeding on one of the members of the party. No information is furnished as to the particular host of the bug in this case. In the Southwestern States and in Mexico this bug infests poultry. Townsend has reported it as "spreading from the roosts to dwelling houses where it proves more formidable than the bedbug." According to available records, this species of the bedbug family occurs throughout the Southwestern States and has been taken as far east as Kansas.

A Chinese scale insect discovered in United States.--Specimens of a diaspine scale received from J. Allison Denning, of the Missouri State Department of Agriculture, reported as collected in a nursery at Glendale, Mo., on althaea (presumably *Hibiscus syriacus*) have been identified by Harold Morrison as *Parlatoria chinensis* Marlatt. This appears to be the first record of the occurrence of this insect in the United States. The species has been intercepted several times by the Division of Foreign Plant Quarantines on material coming into this country from China on rosaceous and other plants, and Sasscer (Jour. Econ. Ent. 11, 1918, p. 126) suggests that the species is apparently a serious pest in China.

----oOo----

UNIVERSITY OF FLORIDA
3 1262 09244 5104